

2500/405

NATIONAL
QUALIFICATIONS
2005

FRIDAY, 6 MAY
1.30 PM – 2.25 PM

MATHEMATICS
STANDARD GRADE
Credit Level
Paper 1
(Non-calculator)

- 1 You may **NOT** use a calculator.
- 2 Answer as many questions as you can.
- 3 Full credit will be given only where the solution contains appropriate working.
- 4 Square-ruled paper is provided.



FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: Area = $\frac{1}{2}ab \sin C$

Standard deviation: $s = \sqrt{\frac{\sum(x - \bar{x})^2}{n-1}} = \sqrt{\frac{\sum x^2 - (\sum x)^2/n}{n-1}}$, where n is the sample size.

1. Evaluate

$$3 \cdot 8 - (7 \cdot 36 \div 8).$$

2

2. Evaluate

$$2\frac{1}{3} + \frac{5}{6} \text{ of } 1\frac{2}{5}.$$

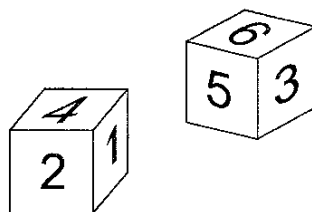
3

3. Evaluate

$$12.5\% \text{ of } \pounds 140.$$

2

4. Two identical dice are rolled simultaneously.



Find the probability that the total score on adding both numbers will be greater than 7 but less than 10.

2

[Turn over

5. In an experiment involving two variables, the following values for x and y were recorded.

x	0	1	2	3	4
y	6	4	2	0	-2

The results were plotted, and a straight line was drawn through the points. Find the gradient of the line **and** write down its equation.

3

6. Solve the equation

$$\frac{2}{x} + 1 = 6.$$

3

7. The speeds (measured to the nearest 10 kilometres per hour) of 200 vehicles are recorded as shown.

<i>Speed</i> (km/hr)	30	40	50	60	70	80	90	100	110
<i>Frequency</i>	1	4	9	14	38	47	51	32	4

Construct a cumulative frequency table and hence find the median for this data.

3

8. A number pattern is given below.

1st term: $2^2 - 0^2$

2nd term: $3^2 - 1^2$

3rd term: $4^2 - 2^2$

(a) Write down a similar expression for the 4th term.

1

(b) Hence or otherwise find the n^{th} term in its simplest form.

3

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9. (a) Emma puts £30 worth of petrol into the empty fuel tank of her car.

Petrol costs 75 pence per litre.

Her car uses 5 litres of petrol per hour, when she drives at a particular constant speed.

At this constant speed, how many litres of petrol will remain in the car after 3 hours.

- (b) The next week, Emma puts £20 worth of petrol into the empty fuel tank of her car.

Petrol costs c pence per litre.

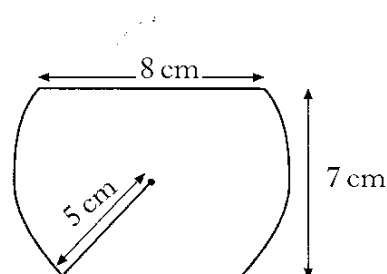
Her car uses k litres of petrol per hour, when she drives at another constant speed.

Find a formula for R , the amount of petrol remaining in the car after t hours.

10. A badge is made from a circle of radius 5 centimetres.

Segments are taken off the top and the bottom of the circle as shown.

The straight edges are parallel.



The badge measures 7 centimetres from the top to the bottom.

The top is 8 centimetres wide.

Calculate the width of the base.

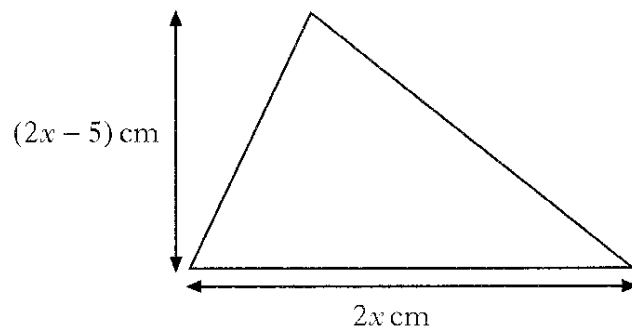
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11. $f(x) = 4\sqrt{x} + \sqrt{2}$

(a) Find the value of $f(72)$ as a surd in its simplest form.

(b) Find the value of t , given that $f(t) = 3\sqrt{2}$.

12. The height of a triangle is $(2x - 5)$ centimetres and the base is $2x$ centimetres.



The area of the triangle is 7 square centimetres.

Calculate the value of x .

[END OF QUESTION PAPER]

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3	3
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